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ON ZEBRA-HORSE HYBRIDS.

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(Plates I., II., III.)

The Zebra Sire of the Hybrids.

During the last two years I have bred five hybrids by crossing mares with a Zebra (*Equus burchelli* var. *chapmani*). The first hybrid was born on Aug. 12th, 1896; the others were born during the summer of 1897. The dams of the respective hybrids are (1) an Island of Rum pony, (2) a Shetland pony, (3) an Iceland pony, (4) an Irish mare, (5) a cross-bred Clydesdale mare.

The sire ("Matopo") of all the hybrids is a handsome 12.3 hands Burchell's Zebra, probably from the Transvaal. As fig. 1 (Pl. I.) shows, Matopo is well formed, with powerful legs and, for a Zebra, a fine neck and fairly good shoulders. In his movements he is almost perfect. When trotting, the fore legs move gracefully, without suggesting the hammering action of the hackney; and when galloping he seems to bound along as if without effort, and with but little expenditure of energy.

If Zebras deserve the ill character they have hitherto borne, Matopo must be an exception to the rule. We are too apt to forget that until Zebras have been under domestication for some generations, it is unfair to judge them by the Horse standard, which after all is not so very high. I have known several perfectly docile captured Zebras, and I have had in my possession a filly (taken when quite young in the Transvaal) which from the first was as docile, tractable, and trustworthy as any pony that was ever foaled. I have refrained from handling Matopo for obvious reasons, yet there is never any difficulty in managing him, unless when he is herding mares, or unusually excited. When in a field with mares he is unapproachable, for, regardless of consequences, he attacks all who venture into his vicinity. Galloping up open-mouthed, uttering his characteristic call, he endeavours to seize intruders by the legs. On one occasion, in a small paddock, he guarded a dozen mares so well, that it took four of us nearly two hours to drive them into their boxes. He is, however, easily upset by unusual noises, and there is nothing that drives him into a state of frenzy so readily as carpet-beating, or that cows him so effectually as a coil of rope. I have often wondered if the rhythmic beating of carpets reminds him of the day when in far-off Africa he lost his freedom; of the time when Boers entangled his limbs to music made by Zulus beating their shields with their assegais.

The more characteristic stripes of Matopo are seen in figs. 1 and 2 (Pl. I.). I have already described at some length* the plan of the striping in various Zebras, and hence only a short account of Matopo's markings need here be given.

Fig. 2 (Pl. I.) shows a series of pointed brow arches, some of which end in a frontal tuft nearly two inches in length. Continuous with the frontal stripes are a number of vertical stripes. These stripes extend to the muzzle, the dark skin of which is sparsely covered with short light hairs, except above the nostrils where there are dark brown "nostril patches." There is usually a distinct shoulder-stripe in Zebras, passing downwards from the withers to bifurcate about the level of the shoulder-joint. In fig. 2 (Pl. I.) the shoulder-stripe is double, while in fig. 1 it has blended with a humeral stripe. Between the shoulder-stripe and the occipital crest there are usually twelve cervical stripes, all of which run up into the mane to form, with a corresponding number of white bundles, a series of black and white tufts. Lying between the two upright rows of tufts, and continuous with the dorsal band, is the mane proper, consisting of more or

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* 'Veterinarian,' November, 1897.

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less upright black hairs. The most anterior part of the mane, instead of forming a forelock, extends beyond the level of the ears, and projects forwards at right angles to the long axis of the face. Behind the shoulder-stripe there are, on the left side, five broad, nearly vertical stripes, all but the last reaching the dorsal band above, while all but the first reach the ventral band below. Behind the fifth vertical stripe are a number of broad oblique stripes, with indistinct "shadow" stripes between them. One of these oblique stripes, beginning at the root of the tail, runs forward to pass over the point of the ilium (hip) before bending sharply downwards to reach the ventral band. I have named this the great flank-stripe. Below this flank-stripe a second, having a similar course, may be known as the intermediate flank-stripe. The intermediate stripe is followed by a third, which, starting some distance below the root of the tail, runs obliquely across the quarters to bifurcate over the stifle, the anterior division proceeding towards, but not actually reaching, the ventral band. This may be known as the lower or stifle flank-stripe. These three flank-stripes are equally distinct on the right side, the bifurcation over the stifle being especially evident.

In the space formed by the splitting of the shoulder-stripe are several indistinct arches, and below these arches are the transverse bars of the leg. In some cases this V-shaped space contains portions of seven arches, and the legs may be striped to the hoofs. Below the stifle-stripe there are first oblique and then nearly transverse stripes across the hind leg, with sometimes shadow-stripes between. In Matopo the stripes are indistinct on the lower part of the hind leg, but in many Zebras they become more distinct and relatively broader as the hoof is reached. It will be further observed from the figures (*a*) that the upper part of the tail is distinctly striped, and that, as in an Ox, only the lower part of the tail carries long hairs; (*b*) that though there is a large wart (chestnut) on the fore leg, there is no vestige of a wart on the hind leg, and (*c*) that there is no tuft of hair at the fetlock.

It may be mentioned that in no two Zebras, or on the two sides (Plate I., figs. 1 and 2) of the same Zebra, is the striping alike, that in some cases there are nearly as many shadow as there are ordinary stripes on the neck and body; that even in some Burchell's Zebras there are stripes across the croup and rump which suggest the "gridiron" of the Common Zebra (*E. zebra*); and that while in summer the dark stripes are nearly black and the light stripes cream-coloured, in winter the dark stripes are occupied by fairly long brown hairs, while the light stripes are made up of equally long white hairs; the light tufts at the side of the mane, however, are white summer and winter. It may be added that Matopo, like the majority of the Burchell group of Zebras, being adapted for a life on the plains, has rounded hoofs and comparatively short ears. He thus differs from the Mountain Zebra (*E. zebra*), and from his stable companion, a white Egyptian Donkey, in which the hoofs are long and narrow, while the ears measure 11½ in., five inches more than in Matopo.

The Hybrid "Romulus."

The oldest hybrid (Romulus), as already noted, was born on the 12th of August, 1896, the period of gestation being three hundred and forty-two days,—in the mare it is usually from three hundred and forty to three hundred and fifty days. The dam of Romulus was a 13-hands, black Island of Rum pony, lent for the experiments by Lord Arthur Cecil, of Orchardmains, Kent. The well-bred black ponies of the Scottish Western Highlands and Islands, which have long been under observation, form a distinct breed, well adapted in many ways for crossing with Zebras. Their resemblance to Eastern Horses has been accounted for by saying they have descended from sires which escaped from the ships of the Spanish Armada.*

Romulus, when a few days old, was the most attractive little creature I have ever seen (Plate III., fig. 1). He seemed to combine all the grace and beauty of an Antelope and a well-bred Arab foal. Instead of, like his sire, looking as if freshly painted for a Lord Mayor's Show, he was faultless in colouring and in the disposition of the stripes, spots, and bands. The body colour was chiefly of a bright golden yellow, while the stripes and spots were of a rich dark brown; but what was especially remarkable was the indescribable sheen of his coat, the dark bands being especially lustrous. A casual glance showed that in the plan of his striping Romulus was utterly unlike his sire, and, when a careful examination was made, it became evident that in the number and arrangement of the markings he was not unlike a Somali Zebra. As fig. 1 (Pl. II.) shows, the brow has been tattooed as if to represent a huge finger print. Instead of the four or five acutely-pointed frontal arches of his sire, there are fourteen rounded arches, that remind one of the face of the Somali Zebra. Instead of twelve cervical stripes, as in Matopo, there are in Romulus twenty-four cervical stripes, all of which can be traced into the mane. In having so many cervical stripes, he seems to be more primitive than even the Somali Zebra (in which I have never seen more than fourteen cervical stripes), but closely agrees with one of my Zebra mares when the shadow stripes are included. The shoulder stripe bifurcates higher up than in Matopo, and there are seven indistinct arches in the triangular space below the point of bifurcation. Behind the shoulder stripe there are nine (Plate III., fig. 1) fairly distinct vertical stripes instead of five, as in his sire (Plate I., fig. 1). Apparently corresponding to the three flank stripes so often seen in Burchell Zebras, there are in the hybrid three stripes in front of the stifle, which first run upwards and then arch backwards to end below the root of the tail (Plate III., fig. 1). In the triangular space between the first flank stripe and the ninth vertical body stripe are numerous narrow indistinct lines, some of which proceed towards the ventral band, while others join the first or great flank stripe. In line with these nearly transverse stripes there were at birth numerous spots arranged in nearly transverse rows over the loins and rump. Now that the hybrid is over a year old (Plate III., fig. 2) most of the spots have united to form somewhat zigzag narrow bands, almost identical in their direction with the narrow stripes over the hind quarters of the Somali Zebra. On the left side the blending of the spots has advanced further than on the right. Counting from the shoulder stripe to the root of the tail there are forty-three stripes in the hybrid,—about the same number as in the Somali Zebra; in Matopo there are only five transverse stripes behind the shoulder stripe (Plate I., fig. 1). It seems to me the blending of the spots over the hind quarters of Romulus goes a long way towards proving that stripes are in many cases first represented by spots or interrupted zigzag wavy lines. Between the stifle or third flank stripe and the point of the hock there are a number of dark bands (between some of which are shadow stripes), while below the hock there are first several distinct transverse bars, and then a number of less distinct oblique lines, right down to the hoof. Similar bars and lines occur on the fore-limb. These leg bars were at birth more distinct than in the Zebra sire. Continuous with the mane is a well-defined dorsal band (with a narrow yellow band at each side) which extends some distance into the tail. The tail in the hybrid had, at birth, long hairs right up to the root, but, notwithstanding this, there were three distinct bars visible at each side; similar tail bars I have once seen in a Horse.

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* Further particulars as to Mulatto, the dam of Romulus, will be found in the 'Veterinarian' for November, 1896.

Though the ears look long in some of the photographs, they are now relatively very little longer (though rounder at the apex) than in the majority of Horses. The nostrils, in their shape, position, &c., are Zebra-like, and the eyes and eyebrows may be said to be intermediate; but the eyelashes are long and curved, and quite unlike the short almost straight eyelashes of Zebras and Horses. The feet of Romulus suggest the Zebra more than the Horse. They seem to be made of excellent stuff, and to stand a good deal of wear. In his movements, the hybrid takes more after his sire than his dam. A few minutes after birth he was rushing about his box, impatient apparently to join the parental troop. What has struck me from the first has been his alertness and the expedition with which he escapes from suspicious or unfamiliar objects. When quite young, if caught napping in the paddock, the facility with which he, as it were, rolled on to his feet and darted off was wonderful. The principal enemy of the Zebra seems to be the Lion. To escape from the Lion, great and sustained speed is not so requisite as a decided and rapid bound when the Lion makes his spring, or when he is accidentally met with in the veld. This rapidity of getting out of the way has been strongly inherited by all the hybrids. Zebras, as far as my experience goes, are difficult to handle, not so much because they are vicious or intractable, as because they are afraid. At any moment they may be seized by panic,—when they imagine there is a Lion in the path,—and, regardless of consequences, rush, it may be, against a wall or a hedge, or into a ditch, reins and bits counting for little or nothing. In schooling the hybrids, this habit will require to be allowed for, and the tendency to bound or rush slowly combated. As it has been completely overcome by careful training in some Zebras, there should be comparatively little difficulty in breaking the hybrids. As a matter of fact, Romulus leads anywhere, is perfectly docile, allows his feet to be trimmed and his teeth to be examined, and, when little more than a year old, seemed quite willing to carry a small boy on his back.

I mentioned Mulatto is just under 13 hands, while the Zebra sire is nearly 12.3 hands. At birth (August 12th, 1896) Romulus measured 34½ in. (from the withers to the ground); at two months 38½ in.; at six months 43 in.; and at twelve months 45½ in. The rate of growth has been extremely inconstant,—*e.g.* from the 12th of February to the 12th of April he only increased half an inch,* and from the 12th of June, 1897, to the 12th of September, 1897, he only increased three-quarters of an inch†; but from the 12th of September, 1897, to the 12th of December, 1897, he increased one and a quarter inches. He now measures (January 12th) 47½ in., nearly 12 hands, and the circumference of the fore-shank is 6⅛ in., the knee being 10 in., and the girth 52½ in.

The foals of the black Island of Rum ponies are frequently of a mouse-dun colour, with at times an indistinct dorsal band, and a cloudy patch over the shoulder. Usually after the first coat is shed the pure-bred foals are dark brown, and later nearly black, with sometimes indistinct dappling over the flanks and hind quarters. As already mentioned, the body colour of Romulus at birth was chiefly of a yellow tint, the yellow approaching bright orange on the brow, while it approached a straw colour at the muzzle and below the knees and hocks. Under the neck and under the belly the prevailing body colour was dark brown, the ventral band being very indistinct.

The ears were lined with fine bright orange-coloured hairs. When only a month old, the hybrid began to shed his foal's coat.

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* He was weaned on the 14th of February, and fretted not a little for some time after.

† During the greater part of this period he was shedding his old and growing a new coat.

The light-coloured hairs began to drop out from the face and neck about the middle of September, and by the end of September he looked considerably darker. The yellow and also the dark brown hairs continued to fall out, except over the back, all through October, and by the middle of November only the orange-coloured lining of the ears was left to remind one of the rich coat he wore during the earlier weeks of his life. By the end of November the new coat was established. The bright orange facial bands were replaced by much paler bands, the muzzle was nearly brown in colour, the neck and body intermediate spaces approached a mouse-dun colour, while the lower parts of the legs were of a dark brown tint. From the withers to near the root of the tail the hair was especially long and thick. For a time the hair over the croup and the greater part of the rump was so much longer than the hair around the root of the tail that it looked as if part of the hind quarters had been previously clipped. The new coat consisted of a thick layer of woolly hair, from half an inch to nearly two inches in length, and of a less complete coat of stronger hairs, many of which were nearly three inches in length. Near their roots all the body hairs were light in colour, which implies that had the hybrid been clipped, there would have been little or no indication of stripes left. In the Zebra, on the other hand, the dark pigment extends to the roots of the hair, and hence, however short the hair may be, the banding is quite evident. Recently the skin around the root of Matopo's tail was injured, with the result that the hair, together with some of the epidermis, was shed; but even before the points of the new hair could be detected, the position of the dark bands was perfectly distinct. The skin of the Zebra has been described as uniformly black, even under the white bands; but it would be more accurate to say it is of a nearly uniform dark grey colour.

About the middle of March the long hairs began to drop out, and by the end of March they came away in handfuls. As the long hairs were shed from the body, the long hairs were shed from the upper half of the tail, with the result that for a time the tail of the hybrid was little better covered than the tail of his sire. By the end of May all the long hairs—light and dark—had vanished, and early in June the dark and mouse-coloured woolly hairs were coming out. By the 6th of June the dark lustreless winter coat had sufficiently gone around the base of the ears and above the eyes to indicate the colour of the summer coat. All through June and July the process of shedding continued, but by the 12th of August—the hybrid's first birthday—the summer coat was fully established. The dark stripes, which consisted chiefly of strong flattened hairs, looked very prominent. The intermediate bands were of a reddish brown colour over the brow, but elsewhere reminded one of the summer coat of a Stag. Taken as a whole Romulus was very decidedly darker as a yearling than during the early weeks of his existence.

As the long hairs were shed from the body and the root of the tail, numerous hairs dropped from the mane. In an ordinary mule (the foal of a New Forest pony) which I have had for some time, all the long hairs of the mane were shed last summer; but in Romulus, either some of the long hairs were retained, or the new hairs came in before the old ones were lost. At any rate, though the mane was shorter and less bulky and consequently more upright during August, it always consisted of numerous long hairs. At present the mane, which consists of wavy hairs from seven to nine inches in length, tends to fall slightly to one side,—the mane falls slightly to one side in some Zebras.

By the middle of September Romulus had again lost not a few of the brighter coloured hairs, and since then he has been getting again gradually darker. Probably because of the extreme mildness of the season the long hairs have already (January) begun to fall out in much the same way as they did last March.

All the experts who have seen Romulus agree in considering him a decided improvement on his sire, and more attractive and shapely than his dam. Having been handled from the first, he is, as a rule, extremely quiet. Occasionally, however, he clearly indicates he has plenty of courage and no lack of speed. At present he is particularly attached to a small thoroughbred mare. When separated from this mare he is sometimes as restless as his sire when upset by some change in his surroundings. Last week a strange Horse was galloped in the paddock where Romulus happened to be for the day. The hybrid became excited, and gave an excellent demonstration of his trotting and galloping powers, and of how proudly he could carry himself, and this continued for some time after the intruder left the field. Romulus was recently described by an excellent judge of Horses in the 'Scottish Farmer' as "a bonnie colt, with rare quality of bone, . . . and with the dainty step and dignity of the Zebra." There is nothing about the hybrids, strange to say, that suggests the ordinary mule or hinny.

The Hybrid "Remus."

The dam of Remus is a three-parts bred, 14.1-hands Irish mare. "Biddy" has been in my possession since 1893, and is now nine years old. She is a bay, with black points, but no white hairs anywhere, and Remus is her first foal. She is a very gentle quiet creature, and has always been in excellent condition, winter and summer alike.

Evidently the Zebra, before coming here, had not made the acquaintance of any of his equine relatives. When first introduced to Mulatto, he rushed into a corner with his tail between his legs, and uttered peculiar little sounds which strongly suggested abject fear. Some of the ponies rushed at him open-mouthed; others deliberately pelted him with their heels. On the other hand, a bay Arab stallion and various mares could not have been more alarmed had he been a Tiger, or, when he called "Quacha," "Quacha," a troup of Lions. To give him a chance of discovering what sort of an animal a Horse is, I turned him loose one evening with a good-natured but very plucky bay Shetland pony. The pony proceeded to tease the Zebra, who very soon began to show fight. He was soon circling round the pony with the object of seizing her legs. For a time the pony was unprepared for this mode of attack, but ere long adopted similar tactics, with the result that the Zebra was several times brought to his knees.* After a couple of hours the duel came to an end,—the damage being very slight on either side,—and ever afterwards Matopo and "Sheila" were excellent friends. But even during the spring of 1896 the Zebra was ridiculously timid, and even now a very small demonstration leads him to beat a hasty retreat. Biddy was the first fairly large animal he ventured to approach. One day I tied her up in a court about forty feet square, a cloth having been previously bound over her eyes. The Zebra in course of time ventured within a few yards; later he laid his head across her quarters, and then, for quite a long time, across her withers. He next licked her lips, and ended by gently nibbling at her ears. Evidently at length satisfied a big Horse was after all not so terrible an object, he retired to his box and finished his corn. Having once learned the peculiarities of a mare he never forgets them. Some of the mares he dislikes, while he is very fond of others, getting quite excited when they pass his own particular quarters. Donkeys, however, he completely refuses to take the smallest notice of.

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* I may mention that when his legs are touched with a rope or stick he almost invariably drops on to his knees, or lies down altogether. This is, think, the result of his having been periodically thrown before he came here that his hoofs might be looked to.

Remus—born on the 18th of May, 1896—was, at birth, relatively smaller and far less active than Romulus; the period of gestation was three hundred and forty-six days. When a day old he measured 35½ in., his girth being 28 in. On the 18th of June he had increased to 38¾ in., the girth being 36 in. When six months old he measured 44⅞ in., the girth being 47½ in., the circumference at the knee 9¾ in., and below the knee 5¾ in. Romulus at six months was 42 in.

From the first Remus has been extremely friendly, and yet in some respects he is more Zebra-like than Romulus. For some days he was little more than a machine,—an automaton capable of following a moving object and of sucking. All the special sense organs were apparently at work, but the brain seemed incapable of making much use of the information collected. If I moved away he followed me, and sucked at my fingers or anything else offered him. He heard his dam when she called, but he was unable to discover whence the sound came, and when he saw her at a few yards distance he failed to recognize her. He seemed to like aloes and water quite as much as sugar and milk, and did not mind either strong smelling-salts or freshly-made mustard. Though he kicked aimlessly when pinched, he paid no heed to the application of either warm or very cold substances to his skin. When a dog was first introduced to Romulus, his excitement was intense. He rushed about at a furious rate, striking as opportunity offered with his fore-feet, and holding his head high and stepping high, as if moving through long grass, where other enemies might lie concealed. Remus, on the other hand, when two days old, allowed a yellow collie to lie down within six inches of his muzzle, and only got up as a Dalmatian approached when a warning note was uttered by his watchful parent. When the four hybrids and two pure-bred foals were eventually weaned, Remus seemed to mind very little. While one of the hybrids and a half Arab foal were biting and kicking and rushing about as if demented, Remus simply stood looking over the fence. But by-and-by, when the others settled down, he set to walking backwards and forwards behind the wall of his court, exactly like his Zebra sire, and though he still keeps this up as if he were a caged Lion, none of the others have followed his example. When Romulus was weaned, he for some days rushed about, as much as a Zebra when highly excited, as his sire when upset by the beating of carpets. Recently it was necessary to give the hybrids milk containing thymol. The pure-bred foals offered but little resistance, but all the hybrids fought till they were exhausted, and nothing would persuade Remus to swallow the first dose.

As might have been expected, Biddy's foal is much lighter in colour than Mulatto's. With the exception of the muzzle and the lower part of the legs, the body colour is a rich light bay; the muzzle and legs were, at birth, more of a mealy colour, but are now of a bay colour. The bands are much lighter, and consequently less distinct than in Romulus. As a rule they are of a dark reddish brown hue, being especially evident on the brow, the forearms, and above and below the hocks. The plan of the striping is the same as in Romulus; but even at birth several of the rows of spots across the croup had already united to form narrow bands. The face, measured from the occipital crest to a line connecting the upper margins of the nostrils, was slightly longer than in Romulus; but the ears were the same length—six inches.

Sometimes when a Horse utters a warning call all the members of the herd hurriedly collect together and rush about in an excited manner. It seems to be of the utmost importance for wild *Equidæ* to at once make out the direction of any given sound. Probably the longer the ears the quicker this is accomplished. If the length of the ears, as is most probable, counts for much, one can understand why they almost reach their full size at birth. Foals are given to straying in all directions, and unless they hear and at once recognize the call of their respective dams, and the direction from which the sound comes, their chances of surviving in a wild state would be greatly reduced. At birth, the ears of Romulus were longer than in his dam, and only slightly shorter than in his sire. In the case of Remus they were the same length as in his dam, *viz.* six inches along the inner aspect.

The eyes in Biddy's foal are hazel-coloured and gazelle-like in their mildness, and the eyelashes are particularly long and curved. The mane was at first made up of soft hairs, which bent over to the right side. The mane, however, soon assumed an upright position, and now, when nearly eight months old, it consists of nearly erect but not very stiff hairs. It looks as if the mane will always be as upright and as short as in his sire. The tail contains fewer hairs than any of the other hybrids, and has three bars across the root. On the other hand, unlike ordinary Mules, there are chestnuts on the hind legs as well as on the fore. The front chestnuts are large, level with the skin, and Zebra-like; the hind chestnuts are raised above the level of the skin, and, though narrow and only half an inch in length, are Horse-like. That the Zebras and Asses have no chestnuts on the hind legs may perhaps be due to the absence of chestnuts in their remote ancestors; their absence points, I think, to Asses and Zebras having sprung from a different ancestor (perhaps Hipparion) than the Horses, which may have descended straight from Protohippus. If Remus survives, he may reach a height of nearly 14 hands, and be the most handsome and fleetest of all the present crop of hybrids.

As in the case of Zebra foals, the hair over the back and hind quarters of Remus soon increased in length, and formed a thick woolly covering. The hair of the first coat usually falls off soonest from the face and neck, then from the legs, especially at the knees and above and below the hocks. Some of the hair was shed from the face by the end of the first month, but there was still some left on the muzzle and brow at the end of the third month, and the legs retained some of the foal's coat at the end of the fourth month. The second coat, which was completed by the end of the fifth month (*i.e.* about the middle of October), consists of a thick inner coat of bay and brown fine wavy hairs, averaging an inch and a half in length, and of an outer but much less abundant coat of stronger hairs, many of which are 2½ in. in length. Neither the long nor short hairs nor the hairs of the mane have yet (January) begun to fall out.

The Hybrid "Brenda."

The dam ("Lady Douglas") of Brenda is a cross-bred Clydesdale mare, built on the lines of the "Douglas" breed, once common in the Hamilton district. Like Biddy, she is a bay with black points, but, unlike the Irish mare, she has a large "blaze" on the face, a heavy mane and tail, and a liberal amount of hair at the fetlock joints. Lady Douglas is 15 hands high, the circumference at the knee is 13½ in., and below the knee 9 in. The face is longer than in Biddy by nearly an inch, and the ears by three-quarters of an inch. I expected Brenda (the Clydesdale's first foal) to closely resemble Remus in colour and markings, but in breeding, more especially in cross-breeding, the unexpected often happens. We are too apt to forget that, even when the sire belongs to a different and very distinct species, the progeny may take after the cross-bred dam. It was evident soon after Brenda (Plate II., fig. 2) was foaled that she differed not a little both from Romulus and Remus. In the first place her ears looked extremely long; they were at birth 6½ in., only a quarter of an inch shorter than the ears of her dam, and quite as long as the ears of her sire. The ears now measure seven and a half inches; on the other hand the head is relatively short—shorter than the head of a 12-hands Iceland pony's hybrid. The height at the withers was 43 in., one inch more than in Remus, and four inches more than in the Iceland hybrid. At birth Brenda, apart from her ears, looked not unlike an ordinary bay foal, but soon faint stripes began to show themselves, and in a day or two the stripes, though indistinct, were seen to closely agree in their arrangement with those of the other hybrids. Now that the "Clydesdale" hybrid is nearly seven months old, she at a little distance might easily be mistaken for an ordinary foal. Compared with Remus the head is shorter and finer, while the joints are larger and the shanks thicker. At six months the circumference at the knee was 10¼ in., and below the knee 6⅛ in.—almost exactly the same as in Romulus when seventeen months old. The mane, at first nearly upright, short and Zebra-like, is now made up of hairs from eight to ten inches in length (nearly as long as in an ordinary foal of the same age). Except near the withers and between the ears the mane arches freely to the right side, some of the hairs almost touching the neck. The hair between the ears already projects forwards to form a forelock. In Remus, as already mentioned, the mane is still upright, and shorter than in his sire. The tail in Brenda has also from the first been heavier than in any other of the hybrids, and fewer hairs have been shed from its base; further, almost from the first there have been a few hairs at the fetlock joints. The hairs around the small ergots are now over two inches in length.

The chestnuts on the fore legs in the Zebra are large and smooth, and on a level with the skin; in Romulus and Remus they are also large, and hardly if at all above the level of the skin, but they occasionally give off thin scales. In Brenda the front chestnuts, though relatively nearly as large as in a Zebra, project as far above the level of the skin as in a pure Clydesdale foal. The left hind leg carries a small prominent chestnut about a quarter of an inch in diameter, but there is no rudiment of a chestnut on the right hind leg. The hoofs are the hoofs of a Zebra, and considerably smaller than would be the hoofs of a Clydesdale foal of the same age. They are wide behind and rounded in front, but the bars are relatively short, *i. e.* they do not extend as far back as the frog. I may add, the nostrils are in their shape a little less Zebra-like than in the other hybrids; that the muzzle suggests the dam more than the sire, the lower lip being, as in the dam, somewhat long; and that the rounded ears are tipped with white, as is occasionally the case in dun ponies as well as in Zebras. As might have been expected, the trunk and hind quarters are more massive than in Remus, while the shoulders are less upright, and perhaps as a consequence of this the action at all times is less Zebra-like than in any of the other hybrids. As fig. 2 (Pl. II.) indicates, there is a "swirl" nearly three inches in length extending down the centre of the face between the eyes. The same figure also indicates fairly well the extent of the marking at the end of the second month. The brow arches (hardly visible in the figure) are nearly as pointed as the frontal arches in a Norwegian pony in my possession, and as in the Amsterdam Quagga. This is very remarkable, as in all the other hybrids the brow stripes form rounded arches. The cervical, and in fact all the other stripes as far as they go, agree with the corresponding stripes of Romulus. In the region of the shoulder the markings are very faint, and over the hind quarters only a few indistinct spots and portions of bands can be detected. The lower parts of the legs are only faintly striped, and even the bars across the forearm and the hock are more obscure than usual. But although none of the stripes are very pronounced, there are, strange to say, faint lines between several of the cervical and vertical body-stripes. These lines suggest "shadow" stripes, and seem to correspond to some of the numerous indistinct vertical stripes seen in Zebra-Ass hybrids. In having faint intermediate vertical stripes, this, on the whole, Horse-like hybrid may be said to be, in at least one respect, more primitive (to have reverted further) than either of the other hybrids already described. If this hybrid continues to thrive, she ought to grow into a powerful, active, shapely cob, about fourteen hands in height, hardier and with more staying power than an ordinary mule.

THE HYBRID "NORNA."

The most attractive of last summer's crop of hybrids has for its dam a good-looking 11-hands Shetland pony ("Nora"). This pony, which will be six years old in the spring, had a foal in 1895 to a small black prize Shetland pony ("Wallace"). Nora is in many ways a small edition of Mulatto, and her foal Norna may be said to be a small edition of Romulus. When a few days old Norna, in her colouring, movements, and make, was more fascinating than Romulus at a similar age; and now that she has increased from thirty inches (her height when foaled on June 8th) to nearly forty-one inches she looks (notwithstanding her single hoofs) as if she belonged to some bygone age. Norna has been from the first more intelligent than any of her contemporaries, and always very much on the alert without being at all nervous or frightened. She followed her dam through a crowd of some thousands of people on Jubilee Day without any hesitation, or evincing any signs of fear, and she now leads quietly and allows herself to be measured without offering any resistance. At birth Norna generally resembled Romulus, both in colouring, markings, and shape; but her head was relatively smaller, and the ears relatively shorter. There was, however, a very important and interesting difference between Norna and the other hybrids. As already pointed out, the croup and rump of Romulus were at the outset marked by numerous rows of spots having on the whole a transverse direction. When his new coat was completed, in August last, I noticed that many of the spots had united to form somewhat zigzag bands that in their direction agreed closely with the stripes on the hind quarters of the Somali Zebra. In Norna, instead of spots over the hind quarters, there were from the first numerous narrow and hardly at all wavy stripes, which line for line almost agreed with the markings in the Somali Zebra. But, further, many of these all but transverse stripes reached, or all but reached, a stripe running obliquely across the hind quarters in almost the same position as the oblique stripe in the Somali Zebra which I have elsewhere referred to as the upper *femoral* stripe. The remarkable difference between the markings over the hind quarters of Norna and her sire Matopo, and the equally remarkable resemblance between these markings in Norna and the Somali Zebra, seem to me to throw a flood of light on the relationships of the stripes in the various species and varieties of Zebras, and at the same time strongly to support the view already advanced, that the difference between the stripes of the sire and his various hybrid offspring is in all probability due to atavism or reversion.* If this is the correct explanation, it follows as a matter of course that at least in the markings the Somali is the most primitive of all the known recent Zebras.

That the hybrids have reverted in at least their markings towards a somewhat remote ancestor—it may be a common ancestor of both the Horses and Zebras—is also indicated by the presence of faint "shadow" stripes on the neck. From Matopo having twelve cervical stripes and some Zebras having in addition nine or ten "shadow" stripes, and from Romulus having twice as many stripes as Matopo, it may be inferred the typical number of cervical stripes in Zebras is twenty-four or thereabout. But in Norna, in addition to the twenty-four cervical stripes, there were at least five faint "shadow" stripes. In Zebra-Ass hybrids there are usually many indistinct stripes on the neck and body, and numerous spots over the hind quarters. I consider Zebra-Ass hybrids more primitive in their markings than Zebra-Horse hybrids. In having numerous cervical stripes Norna approaches Zebra-Ass hybrids, and the only explanation of this that occurs to me is that in Norna we have, in the striping of the neck, a further reversion than in any of the other hybrid offspring of Matopo.

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* See the 'Veterinarian,' December, 1897.

During the first three months the mane of Norna was quite upright, though thicker than in the other hybrids. During the last four months the mane has been increasing in length, and it is now no longer upright; the posterior half hangs over to the right side, the part between and in front of the ears forms a thick forelock, while the intermediate portion hangs to the left side.

Norna with her short head, peculiarly tattooed face, and the heavy mane hanging partly to one side and partly to the other, looks very quaint, and seems to differ quite as much from her sire as she does from her dam the black Shetland pony. The coat is now very heavy, the long hairs over the body measuring over three inches, while many of the hairs over the brow are nearly two inches in length. If Norna develops after the fashion of Romulus, she will—a year hence—be a compact small striped pony from 11 to 11.2 hands in height. As is the case with Romulus, there is nothing about Norna that suggests either an ordinary mule or a hinny. She has excellent well-formed feet, only a few short hairs at the fetlock, and not a rudiment of warts on the hind legs.

THE HYBRID "HECKLA."

Heckla's dam is a 12-hands skewbald Iceland pony. There is so much white in this pony (Tundra) and the yellow is so pale that I thought her hybrid foal would be nearly as light as a pure-bred Zebra. As it happens, Heckla is the darkest of all the hybrids, and the stripes are nearly as obscure as in the "Clydesdale" hybrid Brenda. As she lay by her dam shortly after birth, she looked like an overgrown Hare with an unusually long head and relatively long ears. From the first her coat has consisted of long coarse hairs, and the warts on the front legs are prominent, as in her dam. Measuring 32½ in. at birth, she was 43 in. at six months, and is now (January 12th) 43½ in.; the circumference of the knee being 9½ in., and the fore-shank 5½ in. Though Heckla has always carried a heavy coat, and is dark in colour with white tips to her ears, she generally agrees with Romulus in her build and markings; but her action is freer, and more like that of a hackney than a Zebra. She promises to be quite as large and as active as Romulus, and more able than Romulus to withstand cold and to flourish under adverse circumstances.

The length of the head and the shortness of the neck suggest that the Iceland ponies belong to a different race than the black Oriental-looking West Highland ponies. They may be direct descendents of the Horses hunted by the men of the Reindeer Period. Their ancestors may have gradually worked their way northwards with the Tundra fauna which then as now lived near the edge of the ice. If Heckla owes her dark colour to reversion, it may be inferred her ancestors were of a mouse-dun colour.

It is too soon to offer any opinion as to whether Romulus or any of the Zebra-mare hybrids will prove fertile or specially useful either at home or abroad, and it is equally impossible to say whether they will withstand the African Tsetse fly, or have better constitutions than either ordinary mules or Asses, but this much may be said, they all seem very hardy. Romulus has been in perfect health from the first, as indeed has been his Zebra sire, while nearly all my mares and Horses have had colds and other ailments. Quite recently the four hybrid foals and three ordinary foals have been suffering from the presence of *Strongylus armata.* One of the pure-bred foals (Mulatto's second foal to an Arab Horse) died from the effects of the parasite on the 1st of January, and a thoroughbred foal has been reduced almost to a skeleton; but the four young hybrids, though no longer so bright or in so good condition, are evidently rapidly recovering, and will, I trust, be soon all right again.

The editor of the 'Scottish Farmer' believes Romulus "will be invaluable for driving or riding on account of his hardiness," and he has stated that all the hybrids "have feet and legs like whalebone, with the kind of pasterns that Clydesdale men fancy."*

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* 'Scottish Farmer,' Nov. 27, 1897.

It is well known that Captain Lugard and Major von Wissmann have advocated steps being taken to breed Zebra hybrids.

Captain Lugard, in his work on 'Our East African Empire,' writes:—" Some years ago I advocated experiments on taming the Zebra, and I especially suggested that an attempt should be made to obtain Zebra mules by Horse or Donkey mares. Such mules I believe would be found excessively hardy and impervious to the 'fly' and to climatic diseases. . . . . I would even go further and say that their export might prove one of the sources of wealth and revenue in the future; for, as every one knows, the paucity of mules both for mountain batteries and for transport purposes has long been one of the gravest difficulties in our otherwise almost perfect Indian Army Corps." Since this was written much information has been gained as to the dreaded Tsetse fly, but apparently there is extremely little chance of Horses being made immune, being so treated by innoculation or otherwise that they will be able to survive if once infected by the peculiar minute organism so intimately associated with the all too fatal disease.

Further, owing to the destruction of cattle by the rinderpest, the transport difficulties have been increased in Africa, while the Frontier wars have enormously increased the demand for mules in India. On the other hand, it has been proved that it is a comparatively simple matter to cross various breeds of mares with a Burchell Zebra, and if experts are to be trusted the hybrids (Zebra-mules as some call them) promise to be as useful and hardy as they are shapely and attractive. The preliminary difficulties having been overcome, it remains for those in authority to take such steps as may be necessary to ascertain of what special use, if any, Zebra hybrids may be in the various parts of the Empire, but more especially in Africa and India.

As I am anxious to obtain as much information as possible bearing on equine hybrids—on crosses between Zebras, Horses and Asses—and as to the fertility of the various kinds of hybrids (mules, hinnies, &c.), I shall be most grateful for accounts of any experiments hitherto made, more especially with Burchell and other kinds of Zebra. I have not yet heard of ordinary mares having been crossed with Burchell's Zebra in South Africa; but doubtless some of the readers of 'The Zoologist' may be able to give me information on this subject.

NOTES ON THE SEAL AND WHALE FISHERY, 1897.

By Thomas Southwell, F.Z.S.

The take of Seals by the Newfoundland steam sealers in the past season has been the smallest it has fallen to my lot to record in the seventeen years over which my notes have extended, and that notwithstanding the exceptional success of two of the vessels. The twenty ships, of the aggregate capacity of 6232 tons, and manned by 4572 seamen, captured only 126,628 Seals, of the net value of £32,564, as compared with 187,516 Seals, valued at £55,362, in the previous season, itself a very disastrous one. In addition to these about 22,000 were got by the schooners, but the catch is said to have been the worst for eighty years, with the exception of that of 1864. The 'Aurora' heads the list with 27,941, followed by the 'Iceland' (23,014), and the 'Newfoundland' (15,102). These are the only three vessels which exceeded 15,000 Seals. Two others—the 'Nimrod,' with 14,042, and the 'Harlaw,' with 11,614—exceeded 10,000 each; but the remaining fifteen vessels only averaged 2327 each. The 'Mastaff' had the misfortune to be jammed in the ice inside Cape Ray, and only secured 264 Seals. The 'Iceland' and the 'Nimrod' made second trips for 939 and 453 Seals respectively.

The failure of the voyage appears to be due to a variety of causes, the chief of which perhaps was the prevalence of stormy weather, and the consequent unfavourable condition of the ice. It is also thought that the Seals are not so numerous as formerly, but with regard to this there is considerable divergence of opinion; also that the young Harps took to the water earlier than usual this season, owing to the disruption of the ice. There is no doubt, however, that with two or three exceptions the steamers sought the Seals too far to the north. Formerly the sealing steamers all cleared from St. John's, but of late years they have in increasing numbers been taking their departure from more northerly ports; the wisdom of this course appears to be open to doubt, and some of the most experienced sealers still continue to make the port of St. John's their point of departure. Should the vessel strike the ice to the north of the breeding Seals, there is nothing to form a guide to the position of the pack; but on the other hand, should it be too far south, there is nearly always some indication which points to that fact, such as the presence of birds or old Seals. There appears also to be a natural inclination to work to the north in search of the Seals rather than to the south. It happened this year that the fierce gales from the N. and N.W., which prevailed from the 1st to the 20th of March, drove the ice on which the young Seals were then, well off the land, rapidly south to the neighbourhood of Cape Race, and thus they were missed by the majority of the vessels.

As affording some indication of the severity of the season, and of the hardships endured by the crews, I will give a brief outline of the voyage of the 'Aurora,' as reported by Captain Arthur Jackman, one of the most experienced of the commanders. Leaving St. John's on March 10th, the 'Aurora' struck the Seals on the 15th, about 150 miles off Cabot Island, and on that day and the 16th the crew killed 24,000 Seals. On the 17th, while the men were on the ice, "a terrible swell began to heave among the ice, smashing it up, and leaving the men battling for their lives on the floating pans; it was with the utmost difficulty they were got on board." From March 17th to April 7th the crew were engaged in picking up Seals at the risk of their lives, the ship often rolling rail-under; the result was that out of some 60,000 Seals killed only 27,900, nearly all young Harps, were recovered. The 'Aurora' then bore up for home, being at that time about 390 miles S.E. of Cape Race. Capt. Jackman never remembers Seals being taken so far south. Some conception of the terrible hardships and dangers of the voyage may be formed from the fact that four of the crew succumbed to cold and fatigue, and the report states that as many as one hundred men (out of a crew of 298) were laid up at one time with colds. The 'Terra Nova' also lost one of her crew. The 'Iceland,' which went to the Gulf of St. Lawrence, is said to have made the quickest trip on record; she struck the Seals off Rose Blanche, and commenced to kill on March 15th, reaching Harbour Grace, on her return, with 22,000 young Harps, on the 23rd. The

'Harlaw' made her catch of 11,600 in the neighbourhood of Cape Ray.

In a paper on "Seals and the Seal Fishery," printed in the 'Transactions' of the Norfolk and Norwich Nat. Soc. vol. iii. p. 482, as well as in my Notes for 1884, I explained the nature of the practice known as "panning" or "binging," and pointed out its wasteful character; this was perhaps never more fully exemplified than in the past season. The 'Nimrod' lost nine pans of Seals through the ice, under stress of weather, suddenly breaking up; one lot of 250 she recovered eighteen miles distant from the flag which marked their original position. The 'Aurora,' as already mentioned, is said to have killed 60,000 Seals for the 27,000 she brought home, having lost sixty-four flagged pans through the ice being ground up and turned over by the heavy swell. Surely some less wasteful method of securing a cargo could be devised; and in the interest of the future would it not be to the advantage of the sealers themselves that no more Seals should be killed than could at once be taken on board? This destructive practice of killing and panning all the young Seals within reach and leaving it to chance to recover them must before long lead to the most disastrous consequences, and it is not to be wondered at that the shore sealers, whose catch in the past season has been *nil,* should complain of this shocking waste. The large number of young Harps (see 'Aurora' and 'Iceland') taken so early in the season is unusual, and is probably owing to the disturbed state of the ice, the immense sheets on which they are whelped not usually breaking up so as to allow the Seals to be approached until the young ones are able to take to the water. 106,678 of the total catch were young Harps, an unusually large proportion; 2188 were young Hoods; 11,133 were "Bedlamers," or young Seals of the second or third season which had not yet bred; and only 6629 old Seals of both species.

Some of the old sealing captains are men of great intelligence and wide experience, and their interest leads them to appreciate minute differences in the appearance and habits of the Seals which to a casual observer would pass unnoticed. One of these veterans, in conversation with Mr. Thorburn, after alluding to the two "spots" of Hooded Seals in the Gulf of St. Lawrence, stated that the Seals in the western patch whelp about a week earlier than those in the eastern patch; also that the females in the former are much larger than in the latter, and that the reverse is the case with regard to the males. The western patch is found in the neighbourhood of St. Paul's Island, and the other considerably to the eastward. He also confirms the statement that there are two distinct patches of Harp Seals, one whelping inside St. Paul's Island (see Notes for 1896, Zool. 1897, p. 57), and that a similar disparity in weight exists as is observed in the case of the Hoods, the old Saddlers in the one patch exceeding in weight those in the other by an average of about 25 lb. Referring to a summer which he once spent on the island of Anticosti, he mentioned having met there with a large dark-coloured Seal, one of which he shot, "larger than a Hooded Seal, and with a head like a horse or cow," and which, he said, frequents that island during the summer.

None of the Dundee vessels were present at the Greenland young sealing, and the captures in Newfoundland by the 'Esquimaux' (1903) and 'Terra Nova' (3501) represent all the Seals taken by the Scotch vessels, with the exception of a few old Seals, some 400 in all, taken in Greenland by the 'Active' and 'Polar Star.' The 'Alert' brought home from the settlement in Cumberland Gulf, with other produce, 4700 Seal skins and seventy tons of Seal and Whale oil. I do not receive statistics of the Norwegian sealing in the Greenland Seas, but Prof. Collett has kindly informed me that in 1893 about 100,000 were killed, some 20,000 of which were old Seals, and the rest young Harps and Hooded Seals; in 1894 the number was not quite 100,000, 9000 old and the rest young and Hooded; in 1895 rather less than 80,000, of which 9000 were old; and in 1896 between 90,000 and 100,000, 11,000 of which were old Seals. This branch of the sealing trade has quite reverted to the Scandinavians; the same may be said of the Bottle-nose fishery, no Scotch vessels having taken part in it for the last few years. It seems, however, to be successfully prosecuted by the Norwegians, and Prof. Collett tells me that in 1893 they killed 2701; in 1894, 2905; in 1895, 2872; and in 1896, 3301. The figures for 1897 are not yet available.

The Greenland whaling, for reasons which will be fully explained further on, was a complete failure; only one Whale was captured, and one other seen. The condition of the ice in the North Atlantic has been the most remarkable on record, and it happens that an unusual number of observers were present to report on its phenomenal absence which has characterized this very exceptional season. In my Notes for the year 1887, I mentioned that Capt. David Gray's experience led him to the conclusion that there is a certain periodicity in the movements of the ice in the Greenland Seas, the eastern or western limit of its margin reaching its maximum about every five years alternately; so that every tenth year may be expected to produce an "east-ice year," and *vice versâ*. The year 1881 was an "east-ice year," that is, the ice extended far to the eastward from the east coast of Greenland. Capt. Gray, in a communication published in the Proc. Roy. Geo. Soc. for 1881, p. 740, with map, recorded this remarkable eastward extension of the ice, and made some remarks with regard to its probable cause. The year 1886 was so far a "west-ice year," the ice being close packed on the east coast of Greenland (that is, on the west side of the Greenland Sea) that there was no hope of penetrating it in search of Whales; Capt. Gray therefore, ever willing to add exploration to his legitimate business when possible, attempted unsuccessfully to visit Franz Josef Land, but met with very little obstruction until he reached 36° 44′ E. longitude, in the parallel of 75° (Dr. Robert Gray, Zool. 1887, p. 124). It was not till the next year (1887), however, that the ice receded to its farthest west. In 1891 there was again an enormous accumulation of ice off the east coast of Greenland, extending far away to the eastward. According to Capt. Gray's theory, therefore, the year 1897 should be a maximum "west-ice year," and such has been the case to a remarkable extent; where in 1881 Capt. Gray forced his way three hundred miles through floe-ice into the Spitzbergen land water, in the past season the Greenland whalers encountered no obstruction, and the 'Balæna' found no difficulty in passing round the south of Spitzbergen through the Barents Sea to Franz Josef Land, where she cruised amongst the islands of the archipelago, and hunted Walruses in lat. 81° N., accompanied by the 'Active' and the 'Diana.'

All the reports which we have from the eastern polar seas this season, and they have been unusually numerous, extending over a wide area—the Dundee whalers in the Greenland and

Barents Seas, and afterwards to the west of Franz Josef Land, where Mr. Jackson confirms their report that very little difficulty was experienced from ice up to the 80th parallel; Mr. Arnold Pike and the captain of the 'Balæna' to the east of Spitzbergen and Wyche's Land; and Colonel Feilden to the eastward of Novaya Zemyla and the Kara Sea;—all bear testimony to the remarkable absence of ice. The causes which contribute to bring about these extensive variations in the limits of what may be regarded as the polar ice fringe are too complicated for me to attempt any explanation here, even were I at all competent to do so (Capt. Gray offers some very pertinent suggestions in the paper before quoted), but, confining my remarks to the Greenland Seas, there can be no doubt the chief cause of the recent packing of the ice on the east coast of Greenland was the long prevalence of E. and N.E. gales. The 'Balæna' reports that she reached the N.E. fishing grounds about the end of April, and experienced there the worst weather on record.

On May 1st, following a few days of mild foggy weather, there came a succession of N.E. gales, which lasted till the middle of the month, and forced the vessels to seek partial shelter in the pack-ice. This "blizzard" was followed by strong easterly winds; gale succeeded gale until June 20th, and the severity of the weather is described as exceeding anything within the memory of the oldest man in the fleet. The result of this state of things was that the ice became "hammered" against the east coast of Greenland, and was so compacted, that where in ordinary years a belt exists extending seaward from 150 to 200 miles, with open floes such as the Whales love to frequent, in the past season it did not reach more than fifty miles from the shore, and was packed so tight as to be perfectly impenetrable. This condition of the ice was of course fatal to the fishery, as the vessels were unable to search for the Whales in their favourite feeding grounds; and it was not till May 29th that a fish was found. This the 'Balæna' was fortunate enough to capture, and the only other Whale seen in the Greenland Seas during the entire season was sighted about the middle of June, but could not be approached.

There being no prospect of success in the Greenland waters, the fleet, consisting of the 'Active,' the 'Balæna,' and the 'Diana,' had to look elsewhere for a cargo; and the glowing reports of the great abundance of Walruses observed on the shores of Franz Josef Land by Mr. Leigh Smith, Dr. Nansen, and Mr. Jackson, as might be expected, attracted them in that direction, and they took their departure for this new hunting ground on June 25th. The 'Balæna' was the first to arrive, sighting Cape Flora after a twelve days' passage, and she made a clean sweep of the coast, killing 600 Walruses, and leaving little or nothing for those which followed, the 'Active' only securing seventy and the 'Diana' eighty-four. Great was their disappointment, as they expected to find something approaching the numbers seen by Mr. Lamont on the Thousand Islands in 1852, where a herd of three or four thousand was seen, and nine hundred killed by two small sloops, a sight which will probably never again be witnessed. To add to the disappointment, almost all those met with were females and young, and a few young bulls; it was evidently the nursery of the species. Where the old bulls were was not discovered, but the females and their young were exterminated. In the Greenland Seas the Walrus has already become a rare animal, in Davis Strait it is rapidly becoming scarce, and the enormous numbers which formerly inhabited Behring's Strait are subject to such exhaustive demands that they cannot long survive. When we take into consideration the ease with which these animals can be approached, and their slow rate of reproduction, it is safe to predict that the time is not far distant when the species will become totally extinct. It is curious how a new industry may affect the very existence of an old species. I am told that the greater activity in the search for Walruses is due to the sudden demand which has arisen for their hides, which are extensively used by the makers of bicycles for forming buffers; their value has greatly increased in consequence, and good thick bull-hides weighing 350 lb. and upwards sell for as much as 1s. 6d. per lb. The hides brought home this year from Franz Josef Land being those of females and young animals, therefore thin and of light weight, did not realize anything like this price, some being worth as little as 2½d. per lb. The tusks, I am told, realize about 2s. 6d. per lb., and the oil £18 per ton.

In marked contrast to the Greenland fishery, that of Davis

Strait has been a decided success, and the number of Whales seen was considerable. Three Scotch vessels, the 'Eclipse,' the 'Esquimaux,' and the 'Nova Zembla,' were present. Capt. Milne, of the 'Eclipse,' reports that from the middle of September till the middle of October Whales were very plentiful, and that he never saw so many during all his experience. Leaving Dundee on March 30th, he experienced a long and stormy passage, arriving in Davis Strait too late for the north-west and east side fishery. Disco was reached on May 28th, and the passage through Melville Bay presented no difficulties. The west side of the Strait was reached on June 15th, on which day the first Whale was seen. On the following day a large number of fish were seen, and one struck but lost; and a second also broke away. On the 20th, however, a good fish was secured. In Lancaster Sound the three Dundee vessels were caught in a heavy gale and beset for a week. About Oct. 8th a great many Whales were sighted, twenty miles off Cape Kater, but owing to heavy seas and unsettled weather more than one was missed; and on the 13th so rough was the weather that a large fish which had been got alongside broke adrift and was lost. On the 16th, however, they were more fortunate, and secured a fine fish of 11 ft. 4 in. bone, but not till after an exciting experience—by a stroke of the Whale's tail one of the boats was upset and her crew of six men thrown into the water. Fortunately all were rescued, but not till one of them was in a very exhausted condition. Many more Whales were seen by the 'Eclipse' near Hopper Island, and one taken; had she not had the misfortune to lose five Whales owing to stormy weather, doubtless the 'Eclipse' would have returned a full ship; as it was she had three good Whales and three Walrus. The 'Nova Zembla' succeeded in capturing four Whales; her experience was much the same as that of the 'Eclipse.' Many Whales were seen in the longitude of Cape Warrander, Pond's Inlet, Coutts Inlet, and in the vicinity of Clyde River. The 'Esquimaux,' which had been to the Newfoundland sealing, sailed from Cape Breton on May 20th, and took her only fish in Pond's Bay on June 16th. Although in her autumn passage down the west side of the Strait several other Whales were seen, the weather conditions rendered their pursuit impossible; in fact, it was the prevalence of untoward weather, not the absence of Whales, which prevented their returning all "full ships." All three vessels bore up for home about Oct. 27th.

The total produce of the Whale fishery in the past season was 9 Right Whales and 772 Walruses, yielding 143 tons of Whale oil and 120 cwt. of bone. In addition to this the 'Alert' brought home from Cumberland Gulf station 3 cwt. of bone, the yield of a very small Whale of 4 foot bone, and 70 tons of oil, part of last season's catch; and the 'Perseverance,' which had wintered for three seasons at Rowe's Welcome, had the bone of three Whales (30 cwt.), and part of the oil (15 tons), the rest of the blubber having been lost. During her stay in Rowe's Welcome the 'Perseverance' got six Whales, the produce of the other three having been previously sent home by the Hudson Bay Company's ship 'Erik.' It is rather difficult to value this miscellaneous produce; but, taking the 228 tons of Whale oil at £18 per ton, or £4104, and the 153 cwt. of bone at £1600 per ton ("size bone," I am told, has been sold at £1800 per ton) or £12,240; the 772 Walrus hides at, say, £5 each, or £3860; and the ivory, which was light and mostly female tusks, at, say, £200, the total produce would represent a sum of about £20,404, as compared with £16,207 in the previous season.

The Norwegian Fin-Whale fishery, Prof. Collett tells me, is still flourishing, and several of the companies have also established themselves on one of the Faroes, where they are doing well. The Whales taken last year were for the most part *Balænoptera borealis;* also several *B. sibbaldii* and *B. megaptera;* but commonly *B. musculus* is the most numerous. The Cabot Whale-fishing Company, formed at St. John's to prosecute the Fin-Whale fishery after the Norwegian fashion mentioned in my last year's communication (p. 59), has not yet commenced operations, but is expected to do so shortly.

In my last notes on this subject (Zool. 1897), p. 58, fourteen lines from the bottom, for 'Arctic,' read 'Active.'

As on so many previous occasions, I have to tender my best thanks to Mr. David Bruce and Mr. Kennes of Dundee, and to Mr. Michael Thorburn, of St. John's, for their kind assistance.

THE INSECT VISITORS OF FLOWERS IN NEW MEXICO.—I.

By T. D. A. Cockerell,
Entomologist of the New Mexico Agricultural Experiment Station.

While much has been written on the relations between insects and flowers, it must be confessed that the information we possess on this fascinating subject is fragmentary indeed in comparison with what might be known; in other words, there is no locality where flowers grow and insects fly in which new and interesting observations may not be made, while there are whole regions from which we have practically no records.

Hermann Müller, in his 'Fertilisation of Flowers,' gives what might at first sight seem a very complete array of facts, but we find him strongly insisting on the incompleteness of his researches. In America the subject has only been seriously attacked by one observer, Mr. Charles Robertson, whose observations are confined to Illinois and Florida.

The subject is more complicated than might at first be imagined. Repeated observation only confirms the validity of the following rules:—

(1.) Observations made in one year should be repeated in other years, as the results of different years may greatly differ.

(2.) Observations made on a plant in one locality should be repeated in other localities throughout the range of the plant, as the insect visitors are often different in different parts of the plant's range.

(3.) Observations made on plants growing in cultivation, away from their natural habitat, prove little regarding the natural visitors of the plants.

(4.) Observations on the Honey-bee prove little regarding the actions of wild bees; each species of bee must be observed separately, its habits cannot be certainly inferred from observations on other species.

(5.) Observations should be made at different dates during the period of blooming of the plant studied; the visitors at one period may be very different from those at another.

(6.) In every case it is important to state the names of the insects observed. This is perhaps the chief stumbling-block to observers. Even H. Müller in Europe had to leave many of his captures unrecorded, because he could not find out their names. In other countries, where much less is known about the insect fauna, and many of the species are undescribed, the difficulty is much increased.

The object of the present series of papers is to put on record a number of new observations made in New Mexico, adding such comments as the facts may suggest. It will be necessary to introduce more botanical matter than usually appears in the pages of 'The Zoologist'; in fact, similar papers have appeared in botanical journals, their botanical aspect being as important as the entomological.

(1.) *Ranunculus cymbalaria*, Pursh.—A good patch in flower by the Rio Grande, Mesilla, April 19th, 1897. An ochreous *Thrips* was pretty common on the flowers, but no other insects, except a single specimen of the small fly, *Eugnoriste occidentalis*, Coquillett.

(2.) *Argemone platyceras*, L. & O. (*Papaveraceæ*).—At Santa Fé, Aug. 3rd, in the afternoon, found many plants with closed flowers, inside which were numbers of bees, all more or less sleepy, crawling but not flying when disturbed. A beetle, determined by Capt. Casey as *Carpophilus pallipennis*, was also common in the flowers. The bees were as follows:—

(*a.*) *Podalirius occidentalis* (Cresson). — Twenty-eight specimens. I have never taken this on any other flower.
(*b.*) *Diadasia enavata* (Cresson).—Three. Visits other flowers.
(*c.*) *Melissodes menuacha*, Cresson.—Seven.
(*d.*) *M. agilis* var. *aurigenia* (Cresson).—Nine.
(*e.*) *Andrena argemonis*, Ckll.—Two. This species was described as new (1896) from these specimens, and no others are yet known.

One specimen of an Otiorhynchid beetle, *Peritaxia hispida*, Lec., was also taken from the flowers. The consideration of the above case suggests that flowers which are not particularly attractive to bees when open may gain something by affording good sleeping places when closed in dull weather. The bees, when the flowers opened, would fly away, carrying more or less pollen with them, which they might transfer to other flowers. This idea did not occur to me when the observations were made, so I neglected to note the facts which might confirm it.

(3.) *Eschscholtzia mexicana*, Greene (*Papaveraceæ*).— On April 21st, near Dripping Spring, Organ Mountains, the flowers were visited by *Augochlora neglectula*, Ckll., and *Halictus lusorius*, Cresson, var. These are short-tongued bees.

(4.) *Nasturtium sinuatum*, Nuttall (*Cruciferæ*).—By the Rio Grande at Mesilla, April 19th, 1897. The following occurred on the flowers:—

(*a.*) Diptera.—Several *Eugnoriste occidentalis*, Coq.; also a Syrphid.
(*b.*) Coleoptera.—*Phyllotreta pusilla*, Horn, and a *Collops*.
(*c.*) A black Chalcidid.
(*d.*) Bees.—*Andrena salicinella*, Ckll., one female; *Prosapis mesillæ*, Ckll., two males; *Halictus subobscurus*, Ckll., one female; and *Halictus* sp., four females.

(5.) *Streptanthus carinatus*, Wright, var. (*Cruciferæ*).—At Little Mountain, Mesilla Valley, March 26th, took the following on the flowers:—

(*a.*) Bees.—*Apis mellifera*, L., 1758 (*mellifica*, L. 1761); *Agapostemon melliventris*, Cresson; *A. texanus*, Cresson; *Halictus bardus*, Cresson; *H. sisymbrii*, Ckll.
(*b.*) Diptera.—*Calliphora erythrocephala*, Meig. (det. Coq.); *Paradidyma magnicornis*, Towns. = *singularis*, Towns. (det. Coq.).

(6.) *Dithyræa wislizeni*, Engelm. (*Cruciferæ*).—On April 9th, on the campus of the N. M. Agricultural College, Mesilla Valley, the flowers were visited by *Prosapis mesillæ*, Ckll. (male), *Ammophila*, and *Halictus*. At Mesilla, May 29th, the flowers were visited by *Calliopsis australior*, Ckll.

(7.) *Pyrus communis* (cultivated pear).—On the farm of the N. M. Experiment Station, Mesilla Park, April 12th, the following were seen at the flowers:—*Apis mellifera*, several; *Pyrameis cardui*, many; *Diabrotica 12-punctata*, one, eating the petals. I do not find pear-blossoms at all attractive to native bees in New Mexico; in Europe, on the contrary, Müller observed seven different bees.

(8.) *Prunus* (cultivated plum).—In Mesilla, April 18th, 1897, I found at the flowers three butterflies—*Synchloe lacinia*, *Euvanessa antiopa*, and *Anosia archippus*; also a Tachinid fly, *Archytas lateralis*, Macq., and the bees *Augochlora neglectula*, Ckll. (quite numerous), and *Halictus pectoraloides*, Ckll. (a few). The Tachinid was identified by Mr. Coquillett.

(9.) *Pyrus malus* (cultivated apple).—In Mesilla, April 18th, 1897, there were plenty of honey-bees at the apple flowers, but practically no wild bees. I caught on a flower a single *Augochlora neglectula*. An ochreous *Thrips* was fairly common on the flowers at one place. One example of *Eugnoriste occidentalis* was taken. *Anosia archippus* was visiting the flowers of the topmost branches. Müller found nine bees visiting apple flowers in Europe.

(10.) *Bigelovia wrightii*, Gray (*Compositæ*).—I have at different times recorded many insects from the flowers of this plant. The following are some additional data :—In September, close to the Agricultural College, Mesilla Valley, were collected the following :—

(*a.*) Parasitic Hymenoptera, determined by Mr. Ashmead :—*Labeo* sp., male ; *Bracon politus*, Prov. ; *Chelonus electus*, Cr., male ; *Apanteles* sp. ; *Microplitis* sp. ; *Cremnops vulgaris*, Cr., female ; *Agathis tibiator*, Prov., male ; *Microdus fulvescens*, Cr., male ; *Mesostenus* sp. ; *Cremastus* sp. ; *Perilampus platygaster*, Say, female ; *Eurytoma bigeloviæ*, Ashm., male; *Torymus cyaneogaster*, Ashm., female; *Catolaccus incertus*, Ashm., female ; *Eupelmus cyaneiceps*, Ashm., female.

(*b.*) Diptera determined by Mr. Coquillett :—*Euphorocera claripennis*, Macq ; *Tachina orgyiæ*, Towns. ; *Sepsis violacea*, Meig. ; *Oedopa capito*, Loew.

The following Fossorial Hymenoptera, mostly determined by Mr. Fox, are from the flowers of *B. wrightii*. The *Paratiphia* was taken at Albuquerque ; all the others in the Mesilla Valley :—

Scolia sp. aff. *consors*, Sauss.—Sept. 11th.
Astatus elegans, Cr., var.—Sept. 11th.
" *bellus*, Cr.—Sept. 11th.
" *bigeloviæ*, Ckll. and Fox.—Sept. 11th.
Myzine hyalina, Cr.—Sept. 12th.
Gorytes bigeloviæ, Ckll. and Fox.—Sept. 12th.
" *eximius*, Prov.—Sept. 11th.
Nysson solani, Ckll.—Sept. 11th.
Aphilanthops laticinctus, Cr.—Sept. 12th.
" *taurulus*, Ckll.—Sept. 12th.
Eucerceris canaliculatus, Say.—Sept. 12th.
Ammophila pruinosa, Cr.—Sept. 11th.
Crabro abdominalis, Fox.—Sept. 12th.
Paratiphia albilabris, Lep.—Aug. 16th.

NOTES AND QUERIES.

AVES.

Wagtails eating Trout.—Both the Pied and Yellow Wagtails (*Motacilla lugubris* and *M. raii*) have been observed to take Trout fry. They regularly frequent the nursery ponds here in the spring. Each pond is fitted with a fine screen of perforated zinc at its outlet, which collects a considerable amount of floating matter, consisting for the most part of aquatic and other plants. Amongst this floatage a good many insects occur, and these naturally prove an attraction to the birds. Occasionally, however, a small Trout gets too near the screen, and is washed on it by the current, when the Wagtails take advantage of such an occurrence to secure the fish and to devour it. I need hardly say that they are made welcome to any fish they take in this way, as no one here would think of molesting them. The habit, however, seems worth recording.—J. J. Armistead (Solway Fishery, Dumfries).

The Kingfisher in Surrey. — When so much is written about the extermination of *Alcedo ispida* in England, it is pleasant to be able to record that this bird is frequently to be seen so near London as Surrey. The Kingfisher still exists on the Wey and the Mole, the two chief rivers in the county, as well as on their smaller tributaries. About three winters ago I saw a specimen on the river Mole at Cobham; in October, 1897, another on the Pip-brook near Dorking; in the same month another at Bramley, near Guildford, in the valley of the Wey. On the Tillingbourne stream, which rises on Leith Hill and flows westward into the Wey, I have frequently seen Kingfishers; several times near Abinger Hammer, and in May, 1896, at Shere. There is a certain pond in the valley where I suspect a pair nested last season, for I made several expeditions to see them, and was generally rewarded. I am inclined to think that this species has increased in the county these last years; certainly I do not remember having ever seen so many. Can we attribute this to the Wild Birds Protection Acts? A correspondent of the 'Field' recently reported that a pair of Kingfishers had for some time frequented the lake in Battersea Park, a very uninviting part of Surrey one would think. It would be interesting to know whether the birds are still to be seen there. — Harold Russell (Shere, Guildford, Surrey).

[The bird is also to be seen on the Wandle.—Ed.]

Hobby nesting in Hants.—In reference to the note on this subject (*ante*, p. 24), I many years ago knew of a pair of *Falco subbuteo* nesting in the county not far from Stockbridge. The eggs were hatched in the nest of a Magpie, from which I subsequently took one of the young birds, which became very tame, and made a most interesting pet. It lived for several years, but was at last pounced upon by a cat when resting after a heavy meal, and although it succeeded in driving off the enemy, it was mortally wounded in the fray, one of the cat's claws having punctured the skull, as was found on dissection afterwards. The bird was very fond of insects, which formed a portion of its food. — J. J. ARMISTEAD (Solway Fishery, Dumfries).

The Sanderling in Australia.—Referring to my note in 'The Zoologist' (1895, p. 236) on the occurrence of the Sanderling (*Calidris arenaria*) in Australia, I can now further record having seen and handled specimens of this bird, shot in the vicinity of Point Cloates, as follows :—Sept. 22nd, 1895, one shot by myself; Dec. 30th, 1895, one shot by the Rev. Dr. Maclean ; Dec. 12th, 1896, two shot by myself; and Nov. 5th, 1897, two shot and skinned by myself, and forwarded to the Perth Museum, West Australia. From these instances it would seem the bird is a regular visitant to these shores, as the average number of days in a year when I can spare time to walk on the beach with my gun does not exceed six. The Sanderlings shot were always in company with Turnstones and Little Sandpipers (*Actodromas australis*). I may also mention I shot, on Oct. 22nd last, a Barred-rumped Godwit and Allied Dotterel (*Ochthodromus inornatus*). — THOMAS CARTER (Point Cloates, West Australia).

Eggs of the Roseate Tern.—Mr. Grabham's remarks in 'The Zoologist' (1897, p. 510) respecting the eggs of *Sterna dougalli*, I unfortunately did not see until yesterday (Jan. 12th). As Mr. Grabham lives in or near the same city as I do, I am sorry he did not arrange to see my eggs of the Roseate Tern before stating he could not diagnose between the eggs of that Tern and those of allied species, and I feel sure had he seen my specimens he would not have made that declaration. I have conversed with other clever, if not eminent oologists respecting the eggs of this species, and they held the same opinion as Mr. Grabham evidently does, until they saw my series, when they were convinced as to their distinctness; and I shall be pleased to show Mr. Grabham my series. In forming my opinion I do not altogether rely upon the specimens in my possession. I will offer to make the attempt to pick out the Roseate Tern's eggs from a large drawer in which are placed two or three *genuine* eggs of that Tern among a large number of eggs of the Common and Arctic Terns, and I have little fear of being unsuccessful; but I must stipulate that the eggs are not what are called *authentic* American-taken specimens. Mr. Howard

Saunders, in a letter to me, admits that *he* has never seen any Roseate Terns' eggs taken in the Old World that run into some of the variations, &c., of Arctic Terns: "that is (he says), there is no bluish or greenish ground, and the shape is decidedly more elongated; *but* American eggs taken by men of *good repute so far* were not so distinct." I, like Mr. Grabham, have seen very elongated eggs of the Arctic Tern, but I should not mistake them for Roseate's. In my last note to 'The Zoologist' on this subject I put a ? after "late" when referring to the Rev. J. C. Atkinson, whom I am very pleased to hear is still hale and hearty.—E. G. POTTER (14, Bootham Crescent, York).

On the reported Summer Appearance of two Species of Birds in Lapland.—In answer to Prof. Collett (Zool. *ante*, p. 25), I can only say that to the best of my belief the birds in question were what Mr. Wollaston and myself reported them to be, namely, *Bernicla brenta* and *Phalaropus fulicarius*. We spent a long time watching the Geese, which were at no great distance from us, and we both had field-glasses. Mr. Wollaston went to the other side of the lake, and tried to drive the birds towards me, while I hid with the gun; but they would not move from the middle of the water. From the fact that they did not attempt to fly, it seems not improbable that the young birds were unable to do so. The Phalaropes were a great deal nearer to us, and we identified them as we did the Geese, while the birds were still before us, with the help of the 'Handbook of European Birds,' written by Mr. Backhouse. It is quite possible that the Phalaropes were on migration, as the date on which we saw them was Aug. 9th. Short of actually shooting them, I do not think we could have been more careful about the identification; and the picture of the Phalaropes with the other birds by that pool at Kautokeino has been so often in my mind since that I cannot help feeling glad we did nothing to disturb it. — HERBERT C. PLAYNE (Clifton College).

At what Hour of the Day do Birds most usually lay their Eggs?—It would be interesting, I think, to have on record the experiences of readers of 'The Zoologist' on this subject. It is almost a certainty that birds do not lay during the night, but rather in the early morning. My own experience is to this effect. However, I have known isolated cases where the daily egg must have been deposited *late* in the forenoon. I should say the most usual time, restricting the actual limits as much as possible, is between six and seven o'clock; that is, provided we take the month of May as a typical egg-laying month. I may explain my proof of this. In my morning walks, while living in the country, I have gone round those nests I happened to know of, between the hours of eight and nine, and found an additional egg deposited in every one. But on one specially fine morning in May, of which I have clear recollection, I went out at five o'clock to find that not a single egg had been laid. Neither were the birds to be seen about any of the nests. I need not say that before I went out there had been about two hours of broad daylight. This experience of the habits of birds was new to me at that time, and I have not hitherto seen anything touching upon the matter in any of the journals.—J. W. Payne (Edinburgh).

Popular Fallacies concerning the Cuckoo.—*A propos* of the paragraph which appeared on this question in 'The Zoologist' for November (1897, p. 512), perhaps you may consider the Northumbrian version of this rhyme of sufficient interest for insertion. Although it does not differ materially from that in use in the midlands, several little dissimilarities will be noticed. Thus:—

> "The Cuckoo is a pretty bird,
> She whistles as she flies;
> She brings us good tidings,
> And tells us no lies.
> She sucks little birds' eggs
> To make her voice clear,
> And never says 'cuckoo'
> Till summer is near."

This is well known to, and repeated by, almost every school-boy in these parts; another equally popular rhyme being:—

> "In Aperill she shows her bill,
> In May she sings both night and day,
> In June she changes her tune,
> In July away she must fly,
> In August go she must."

The reference to the departure in August must be taken as applying to old birds only (and those are they which *sing*), for young ones remain with us several weeks longer; but how true is the allusion to the change in the song as summer advances! and how admirably is that change expressed in Heywood's lines:—

> "In Aprill the Koocoo can sing her song by rote,
> In June of tune she cannot sing a note;
> At first koo-coo, koo-coo, sing still she can do,
> At last kooke, kooke, kooke; six kookes to one koo."

The "sucking of little bird's eggs" is generally accepted in the north, and I think rightly so, though positive evidence upon the point is always difficult to obtain when wanted. To instance a single case within my own experience, I may mention that one day, a good many years ago, I recollect seeing a Cuckoo under circumstances which left no doubt upon my mind that she was guilty. I was lying concealed in a boggy bit of ground watching for a Water Rail, when a Cuckoo flew out of a bush near by, and settled upon a post and rail which filled up a gap in the hedge. Not being on the alert for proof of egg-eating, I did not pay particular attention to the Cuckoo, and could not say whether or no she carried an egg with her; but on visiting the spot afterwards I certainly did find the recently broken shell and part of the albumen of a Blackbird's egg upon the top of the post where she had been sitting, and in the bush from whence she came was a Blackbird's nest containing three fresh eggs. Had a closer watch been kept upon the Cuckoo no doubt I should actually have witnessed her eat the egg, and perhaps also carry it from the nest; but unfortunately the chance was missed, and such opportunities do not recur every day.

Another trait in the habits of the Cuckoo, which seems sometimes to be doubted, is that she lays her egg upon the ground, and afterwards deposits it with her bill in the nest which she has chosen; but upon our Border moors, where the Meadow Pipit, or "Cheeper," as it is called, is by far the most frequent foster-parent to the young Cuckoo, the fact has long been known to that most observant race of men, the hill-shepherds. I have indeed frequently heard it asserted by these men that if you see a Cuckoo being closely pressed by a Cheeper, which seems particularly angry, while the Cuckoo flies silently and low, you may be certain that she has an egg in her mouth, and is seeking an opportunity of placing it in the Pipit's nest. The natural inference drawn is that the Pipit hopes by her attack to make the Cuckoo drop or break her egg. Should the latter succeed in safely depositing the egg in the nest, no further molestation is offered her; while it is said that she frequently utters her chattering notes as she flies off, as though chuckling to herself over her success.

The following rhyme is also well known upon the Borders, though perhaps scarcely so often heard as the two above quoted:—

> "The Cuckoo comes in mid March,
> And cucks in mid Aprill;
> And gangs her ways at Lammas-tide,
> When the corn begins to fill."

March is so exceptionally early for the arrival of the Cuckoo that it is curious to find that month so often alluded to in these old rhymes, particularly in north-country ones. In very forward springs, however, the always welcome notes have been heard in Northumberland by the first week in April, and, in 1896, so early as March 25th; while in that year a Cuckoo was recorded as having been heard in Berwickshire on Feb. 20th—"a unique record for Scotland"—and apparently believed in!

Another "popular fallacy" concerning the Cuckoo was that it hybernated, and this also has been reduced to rhyme:—

> "Seven sleepers there be—
> The Bat, the Bee, the Butterflee,
> The Cuckoo, and the Swallow,
> The Kittiwake, and the Corncrake,
> All sleep in yon little hollow."

But the subject is inexhaustible, and I shall only quote one more of these rhymes and have done; premising, for the benefit of south-country readers, that however oddly the vernacular may read, the rhythm is good when it comes from the lips of a native:—

> "In Mairch, gin ye sairch, ye may find a Cuckoo,
> But it's April afore ye can hear her;
> When wor weel inte May, she sings night an' day,
> Wi' a voice that graws clearer an' clearer.
> Come in June, very soon she'll alter her tune,
> An' cry kook, kook, kook, kook-coo,
> Wi' a kind o' a chetter, which, gin ye come at her,
> Ye'll find is the out-comes o' *two*.
> By Julee, o'er the sea she's preparin' to flee,
> An' man stairt, or the wether gets cader;
> In August gan she must, an' her young man jist trust
> To the Cheeper, until they get ader.
> An' dod its gey queer, how the time o' the year
> The young be ther sells can remember,
> But whatsever the cause, maist a' body knaws
> They'll a' be away wi' September."

—George Bolam (Berwick-on-Tweed).

Cuckoos sucking Eggs.—I must express my indebtedness to Mr. J. H. Gurney for his very interesting paper in the December issue of 'The Zoologist' (1897, p. 568). I quite accept the evidence he has tendered on the question at issue. I am equally of opinion with Mr. Gurney that to describe Cuckoos as habitually sucking eggs by choice is misleading. When I originally alluded to Cuckoos sucking eggs as a popular fallacy, I of course had in my mind not a few peccadilloes of this kind on the part of individual Cuckoos, but a very generally entertained belief amongst humble folk who have frequently accounted to me for broken eggs in nests early on in April by saying, "Ah! that's the Cuckoo's work." To such and sundry it is of little moment that *Cuculus canorus* seldom proclaims its presence in this country much before the middle of April.—H. S. Davenport (Ormandyne, Melton Mowbray).

PISCES.

Fishes of Great Yarmouth.—I read with great pleasure in the December issue of 'The Zoologist' (1897, p. 539) Mr. Patterson's long and interesting list of the Fishes of Great Yarmouth. There is, however, one point I wish to pass a remark upon, *viz.* in speaking upon *Scorpæna dactyloptera* he says: "Found a specimen of this rare British fish (the second for Great Britain) in a shrimper's catch on April 29th, 1894." This species is of quite frequent occurrence along the east coast of Scotland. I have seen them in the Aberdeen market many times within the past twenty years, often in dozens at a time, and on several occasions from 1 to 4½ cwt., the latter being on July 9th, 1890. For observations on this species I would refer Mr. Patterson to the 'Annals of Scottish Natural History' for October, 1893.—George Sim (52, Castle Street, Aberdeen).

NOTICES OF NEW BOOKS.

Wild Traits in Tame Animals; being some Familiar Studies in Evolution. By Louis Robinson, M.D., &c. William Blackwood & Sons.

It is in such books as these that we recognize the vast influence exercised by Darwinism in the direction of zoological study. In endeavours to trace back the habits of animals to antecedent factors in the struggle for existence, which have received the imprimatur of natural selection, we often seem to meet teleology under a new name, like Pagan customs under more modern creeds. In fact, the evolutionary Dr. Pangloss proclaiming that this is the very best possible system of nature, and that Natural Selection tells us all about it, is not uncommon. On the other hand, there is a quiet undercurrent pervading all zoological work which is the strength of the new teaching, which finds that Darwin's key opens most locks, though not necessarily all, and that patient skill and observation and not forensic sledgehammers are needful at the still closed gates.

These prefatory remarks are necessary to introduce the contents of this most interesting and suggestive book, and to indicate the philosophical conception which has evidently prompted the composition of every page. Dr. Robinson is an observer, and many of our readers and contributors will appreciate the remark that "most of the future discoveries of great moment to the naturalist will be made, not in the remote and minute ramifications of science such as are occupying the attention of so many of our learned investigators, but among the everyday phenomena which are open to the eyes of all." Some may likewise possibly agree with the remark that "there seems also a tendency on the part of a larger number of professional naturalists to assume *quasi*-manorial rights in certain regions of nature's kingdom."

In our author's suggestions as to the "wild traits in tame animals" and his theories thereon, it must be remembered, as we once heard the late Prof. Rolleston remark, that not every shot hits the bull's-eye; and we might add that whilst unproven theories are held as suggestions and not as facts we cannot complain, especially when they are the result of careful observation and deliberate thought as are those in this volume. We can only refer to some, and must leave their consideration to the reader, who will also meet with the arguments for the propositions. The speed and endurance of the Horse is considered to have been primitively acquired by the pursuit of wolves. "The wild horses which in ancient times swarmed over nearly all the great plains of the world, and from which all our modern steeds have sprung, would never have developed the swiftness and staying power which they undoubtedly possessed before they became captives," save for the persecution of the "grim grey wolf," with his "perpetual hunger and untiring gallop." The dread of asses to entering running water, which Darwin considered as indicating that the Ass originally came from a region where water was scarce, is differently interpreted by Dr. Robinson: "Crocodiles and similar reptiles were much more plentiful in the past than they are now. The rivers in all the warmer parts of the world once swarmed with them. If, as is probable, the wild asses' forefathers have inhabited a Crocodile-infested country ever since the Tertiary epoch, they must have had business relations (of a very unprofitable sort for the poor jackass) with these voracious saurians for hundreds of thousands of years. It would be a matter for surprise, especially when we consider the rigidly conservative principles of the donkey tribe, if such a connection had left no traces in the instinctive habits of the race." The original progenitor of the "tabby" Cat is considered as having been a "distinct natural variety which no longer exists as a wild animal." This animal—a true tabby—it is suggested is a "remarkable instance" of "protective mimicry," inasmuch as when curled up asleep it resembles the appearance of a coiled serpent.

We will conclude with one observation made on less debateable ground, which our author believes "has not been alluded to by any naturalist." It relates to the alliance of the Redshank and the Lapwing. "The herdsmen of the Essex marshes are well aware of this compact, and if they find a Redshank's nest they invariably search about with the expectation of finding the eggs of a Plover within a few yards' distance."

EDITORIAL GLEANINGS.

In Prof. Newton's 'Dictionary of Birds' (Introd. p. 2) it was stated that there still seemed to be need of a report by an ornithologist with regard to the species of two of the Geese in the celebrated fresco found in a tomb at Maydoom. Mr. G. E. H. Barrett-Hamilton has recently contributed to the 'Ibis' some results of a careful examination he made of this fresco during a visit to the Ghizeh Museum. There are six Geese in the picture, and, as Prof. Newton states, "four of these figures can be unhesitatingly referred to two species (*Anser erythropus* and *A. ruficollis*)." Of the two larger Geese in question, Mr. Hamilton considers they are "very poor representations of *A. segetum*, and rather resemble the nondescript kind of Geese which may be seen frequently in farmyards in Egypt." His opinion is that "either the artist did not know of the characters which distinguish the various species of Grey Goose among themselves (with the exception of the White-fronted species), or else his intention was to depict both wild and tame Geese together—a course of procedure which would, I think, be quite in keeping with the methods of the artists who produced the beautiful series of animal drawings on the Tomb of Thi, at Sakkârah, which are said to date from about B.C. 3500. The latter drawings show conclusively, I think, that the Egyptians of those early times had both tame Geese and tame Ducks."

"The Birds of London" are the subject of a most interesting article in the last number of the 'Edinburgh Review.' The author defines his area as comprised within a radius of four miles from Charing Cross. Among the record of many interesting facts we may mention that last year there was but one rookery in London. The Dabchick, or Little Grebe, is a regular visitor to St. James's Park. "It is not uncommon in the early hours of the morning for wandering Cuckoos to make their way into the parks, and last spring, about seven in the morning, one even roused the inhabitants of the Temple by its call." The last record of the Nightingale's appearance in London comes from Lincoln's Inn (April, 1897). It is at least singular that while most birds are diminishing, there is a "gradual invasion of London by the Wood Pigeons."

In the 'Strand Magazine' for January, Mr. James Scott has written and illustrated a paper on some experiments he has made to test "Insect Strength." The house-fly and the earwig were selected as the most suitable for the purpose. Mr. Scott appears to rather mix up the Coleoptera and Orthoptera, but his experiments with the earwig cannot be misunderstood, and one of these insects was ingeniously harnessed to a cart 1 in. long and ¾ in. wide, formed with a piece of cardboard, having its sides bent down, between which two pieces of lead-pencil (after the lead had been removed therefrom) were pivoted by means of a couple of needles. To this conveyance was attached the farther end of the cotton connected to the earwig, and then the service of the insect was patiently awaited. After having fully investigated the peculiar "snake" which encircled it, it showed signs of vigour, and made off at what "I suppose must be called a trot, dragging the cart quite easily behind it. Then a match was loaded upon the waggon, making apparently but little difference to the earwig. Matches were successively added until the load comprised an accumulation of eight. At this point the insect showed signs of a faint struggle, such as a horse does when slipping about the roadway with a somewhat heavy burden. Although he managed to propel a heavier load than this, it would be equivalent to overwork if he dragged more than eight. I placed the eight matches upon the scales, and found that their combined weight was twenty-four times that of the insect. Each piece of timber was four times longer than the carrier, making in all a load of wood thirty-two times longer than the earwig. A horse is thicker in depth than breadth; whereas an earwig's breadth exceeds that of its depth. In length (proportionately) there exists little noticeable difference; so that, for the purpose of description, it may be assumed that, except for the difference in the number of legs, a horse corresponds in proportion to an earwig." Mr. Scott has pictorially represented a front view of a horse laden with pieces of timber each of the comparative length of a match. There would be eight of these huge beams, and it "may be fairly doubted whether an ordinary horse (or even a pair of horses) would be endowed with sufficient strength to enable it to shift the load, without expecting the animal to drag it with tolerable ease."

The 'Revue Scientifique,' in its first number for this year, contains an interesting note on "La mémoire des poissons." It is copied from 'Le Chasseur français,' and the incident was related by M. Mœbius. He placed a Pike in an aquarium with some small fish, which he afterwards separated from the "fresh-water shark" by a plate of glass. The Pike at first made desperate efforts to reach his prey, knocking himself furiously against the invisible obstacle till he was frequently giddy and apparently half-killed by the violence of the shock. Little by little, however, his greed succumbed to pain, and he left his desired victims in peace. At the end of three months the plate of glass was removed, and the Pike had thus free access to the fish that were formerly preserved by this obstacle; but, strange to say, he never approached them. The idea of pain, doubtless appreciable to his senses, had become so dominantly connected with the small fish as to prevent any further attack. This experiment—easy to renew—adds much light to the psychology of fishes.

Mr. Percy Selous, in the 'Bulletin de la Société Zoologique de France' (1897, p. 187), contributes some more observations on the habits of Rattlesnakes. In past years his Crotales had fed on nothing but mice, but now they took birds with avidity. Once he introduced a sparrow in a cage containing two large snakes, when both struck at it simultaneously, the bird escaping; but the largest snake had struck the other one by the head, and Mr. Selous had much trouble in separating them. The head of the smaller snake swelled rapidly, and he was afraid it would die, but after some time the swelling disappeared, and the wounded individual swallowed a mouse. This went to prove that their poison is somewhat harmless to the snakes themselves. Another strange observation was that sometimes these snakes disgorge pellets composed of hairs and feathers, after the manner of owls. Mr. Selous was bitten by one of these snakes. He immediately enlarged the wound with his knife, and sucked the same vigorously, till he thought he had extracted the poison, when he filled the wound with permanganate of potash. But the next day he was very ill, and, becoming worse, had to seek medical assistance, when he was ordered strychnine pills. He suffered, however, for some time, and still felt the effect at the time of writing.

In 'A Handy Guide to Fish Culture,' written by J. J. Armistead, and published by "The Angler, Limited," Scarborough and London, the amateur pisciculturist will find much invaluable advice, and the zoologist may glean a few facts. It is a condensation in brochure and very inexpensive form, of a larger work by the same author. Not only is the rearing of Trout described, but the construction, planting, and stocking of a fish-pond made clear to anyone who either wishes to follow the pursuit as a study, amusement, or as a business or source of profit. We have recently noticed several publications connected with aquaria; in this small treatise the reader may advance his knowledge from that afforded by the glass tank to what may be obtained from the fuller experience of a dam, or fish-pond, with its aquatic vegetation which is indispensable, its surrounding trees and plants which afford entomological provender, and the varied animal-life which must be introduced to afford the nutriment of fish.

A REPRESENTATIVE of Reuter's Agency has had an interview with the Hon. David W. Carnegie, son of the Earl of Southesk, who has just returned to England after a thirteen months' journey across the Great Victoria and Great Sandy Deserts of Western Australia. During his travels, which were from the south to the north of the Colony, Mr. Carnegie traversed nearly three thousand miles of unmapped and unexplored desert in the interior of Western Australia. In this country he met very small tribes of wandering blacks. They are nomadic, and this may be explained by the fact that their wells soon became exhausted, and they have always to be on the move in order to obtain water. Their method of hunting, too, causes them to be always moving. They set light to a tract of "spinifex" and then surround the burning bush, and throw sticks and spears at the Lizards and Rats that try to escape. Naturally in a very short time the country gets burnt up. Speaking of the natives in the interior Mr. Carnegie said:—"The people are very dark, and add to their blackness by smearing themselves with grease and ashes, a fact which makes their presence known at a considerable distance. They are very ugly—more like monkeys than anything else, with their flat foreheads and protruding lips. As a rule they are very thin, and of small stature—on two occasions only I saw men upwards of six feet in height. Men, women, and children are all stark naked. They make no houses, and have no villages. They simply scoop out a hole in the sand and squat in it. When they first saw our camels and caravan they were greatly excited, never having seen a white man before. We never suffered any hurt from them, but when any of them got us alone they tried to be nasty, and no doubt would have proved troublesome if they had been given much opportunity. They are only one degree removed from animals. It was only from the smoke caused by their hunting fires that we were able to track them, and so find water. After following their smoke we would suddenly come upon an encampment of them crouching in their holes, with their spare weapons hung up in the few surrounding parched-up trees."

MR. R. B. TOWNSHEND, in a recent communication to the 'Westminster Gazette,' contravenes a published statement that the American Wolf has hitherto proved more than a match for any Dogs that could be brought against him, the matted hair round his throat making him invulnerable. The report went on to say that a new attempt was to be made against the scourge of the flocks and herds of the West with a pair of Irish Wolf-hounds which had been specially imported for the purpose, and were now being trained "on a treadmill" at Louisville, Kentucky. Mr. Townshend writes that the new attempt is not new, except, perhaps, as regards the "treadmill" part of the business. Ten years ago an Irish Wolf-hound, "Leprechaun," bred by him, was taken to the neighbourhood of Fort Calgary, to hunt the Wolves of that district, which were destroying calves and foals. The ranchman who took out his "Lep." also took with him two others, "Patrick" and "Sheelah." They killed forty Coyotes the first winter, 1888–89, and he wrote an account of a run they had with a big Grey Wolf. The Coyote is about the size of a Collie; the Grey Wolf may be anything, from that of a Stag-hound to a Boar-hound. His informant said that "Lep." ran into the Grey Wolf first and the pair rolled over; they sprang to their feet and stood up on their hind legs, tearing at each other, and trying to beat each other down with their fore feet. It was a terrific battle, and twice "Lep." threw the Wolf, and twice the Wolf got away only to be collared again. Then "Paddy" and "Sheelah" came up and joined in, and the three finished him off. The American Wolf is undeniably a very formidable foe, but that time he met his match.

At a January meeting of the Zoological Society of London, the Secretary exhibited, on behalf of Professor Collett, a specimen of a supposed hybrid between the Fieldfare (*Turdus pilaris*) and the Redwing (*T. iliacus*).

We have received the Annual Report (1896–97) of the Curator—Prof. Alex. Agassiz—of the Museum of Comparative Zoology at Harvard College. We learn some particulars as to the official arrangements made by Prof. Agassiz for his expedition during this winter to the Fiji Islands, for the purpose of studying the coral reefs of that group. He was to be accompanied by Dr. Woodworth and Dr. Mayer, as assistants.

"The steamer 'Yaralla' has been chartered in Sydney for the expedition, and she is to meet us at Suva late in October. The outfit for the expedition has been shipped to Sydney to be placed on board the steamer we have chartered. In addition to the usual apparatus, for photographic purposes, for sounding and dredging, and for pelagic work, we take a diamond-drill outfit, and hope to find a suitable locality for boring on the rim of one of the atolls of the Fijis. The boring machinery will be in charge of an expert sent by the Sullivan Machine Company from whom this machinery was obtained. The Directors of the Bache Fund have made a large grant toward the expenses of this boring experiment.

"I am also indebted to Professor Brandt, of Kiel, for superintending for me the construction of a deep-sea self-closing tow-net, such as was used in the 'National' Expedition. Dr. Richard, of Paris, sent me a modified Giesbrecht net, such as is used by the Prince of Monaco on the 'Princess Alice,' and Dr. A. Dohrn kindly deputed Dr. Giesbrecht to send me one of the Giesbrecht nets from the Naples Station. These, together with the old and new styles of Tanner net, which we take with us, as well as a self-closing net adopted by Dr. Townsend of the 'Albatross,' which he was kind enough to have made for me, will give us the means of comparing these different styles of deep-sea tow-nets, and of testing their comparative efficiency under similar circumstances."

A 'Catalogue of British Birds' in the collection of Mr. E. M. Connop, of Rollesby Hall, Norfolk, has been compiled by our old contributor Mr. Thomas Southwell, and contains rather more than is usually expected in such enumerations. The preface is a digest of information respecting the principal private ornithological collections made in Norfolk and their ultimate dispersal. There are also some details as to the life-histories of professional gunners, who have done much for British ornithology, are a vanishing race, and will leave little personal record. The enumeration of the birds is accompanied with—in most cases—careful localisation; date and method of acquisition; if purchased, sale and lot number given; and many other items which will afford material for the British Natural History of the future, when an attenuated fauna will be principally described by the connection it will bear with the authentic records of the past. It is published at Norwich.

In the January number of the 'Annals of Scottish Natural History,' Mr. J. A. Harvie-Brown has written on a subject to which he has paid much attention, "On the Minor Faunal Areas." His own words will give the best introduction to his memoir:—

"At the present time naturalists are endeavouring to arrive at conclusions regarding certain groups of phenomena relating to animal life, which phenomena have every appearance of being intimately associated with one another. These are: Bird Flight, Migration, Dispersal, and Distribution. As a first means towards their study I have long advocated the subdivision of larger areas into smaller sub-areas, and have illustrated my contention by treating this country of Scotland in such a manner. I have defined what we may call 'the Minor Faunal Areas of Scotland' from topographical and faunal standpoints.

"The Minor Faunal Areas of Scotland are at present defined either by the names of the principal river basins or from their isolated positions. 'Dee,' 'Forth,' 'Clyde' are examples of the former, and 'Outer Hebrides,' 'Orkney,' 'Shetland' are examples of the latter; whilst another group is indicated from their somewhat more general geographical position, independent of their great watersheds—and including these—such as 'Moray,' 'Sutherland,' 'West Ross,' or 'Argyll.'"

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